



**Report on My Activities as a National Park  
Transportation Scholar at  
Grand Teton National Park**

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I worked as a National Park Transportation Scholar at Grand Teton National Park from June 2003 to June 2004. This assignment was made possible by the National Park Foundation through the generous support of the Ford Foundation.

The scope of work for my assignment directed me to “be directly involved as a primary member of the planning team” and to lead “the Park’s efforts to implement the plan.” During my tenure at Grand Teton National Park, I worked on the implementation of the transportation plan by developing a Grand Teton National Park Intelligent Transportation Systems (ITS) Architecture. This architecture was based on the ITS elements present in the draft preferred alternative of the transportation plan. This was the only portion of implementation work that I could perform, as the transportation plan was not completed during my tenure at Grand Teton National Park.

I spent the bulk of my time on analyzing the draft transportation plan and on coordinating the park’s review of the plan. At the time of my arrival at Grand Teton National Park, the park had many projects underway. Two projects in particular, the planning for a new park visitors center and the enactment of new winter use regulations, were of a higher priority than the transportation plan and subsequently took up the vast majority of my supervisor’s time. This slowed the process down considerably, as the transportation planning process was often stalled pending my supervisor’s approval on advancing to the next step in the process. While waiting for that approval, I sometimes assisted on other planning projects, including work on environmental assessments to convert the former Whitegrass Dude Ranch into an historic preservation training center and to convert the Lucas-Fabian Homestead into a site that would be home to an Artist-in-Residence Program. Another factor stalling work on the transportation plan was the lack of a permanent Superintendent and Deputy Superintendent in the park for a few months. Senior park management was very reluctant to make some key decisions on the transportation plan until the new Superintendent and Deputy Superintendent arrived in the park in May.

Below I provide some examples of what I worked on during my tenure as a National Parks Transportation Scholar at Grand Teton National Park:

## **Intelligent Transportation Systems Architecture**

An ITS architecture provides a framework for planning for the deployment of technology on the surface transportation system, similar to a blueprint providing a framework for the construction of a house. An ITS architecture describes a system’s functions (such as the collection of parking data), the physical entities in a system (such as park rangers or detection equipment) and the information flows in the system (such as the dissemination of parking lot occupancy data from a park ranger to park headquarters).

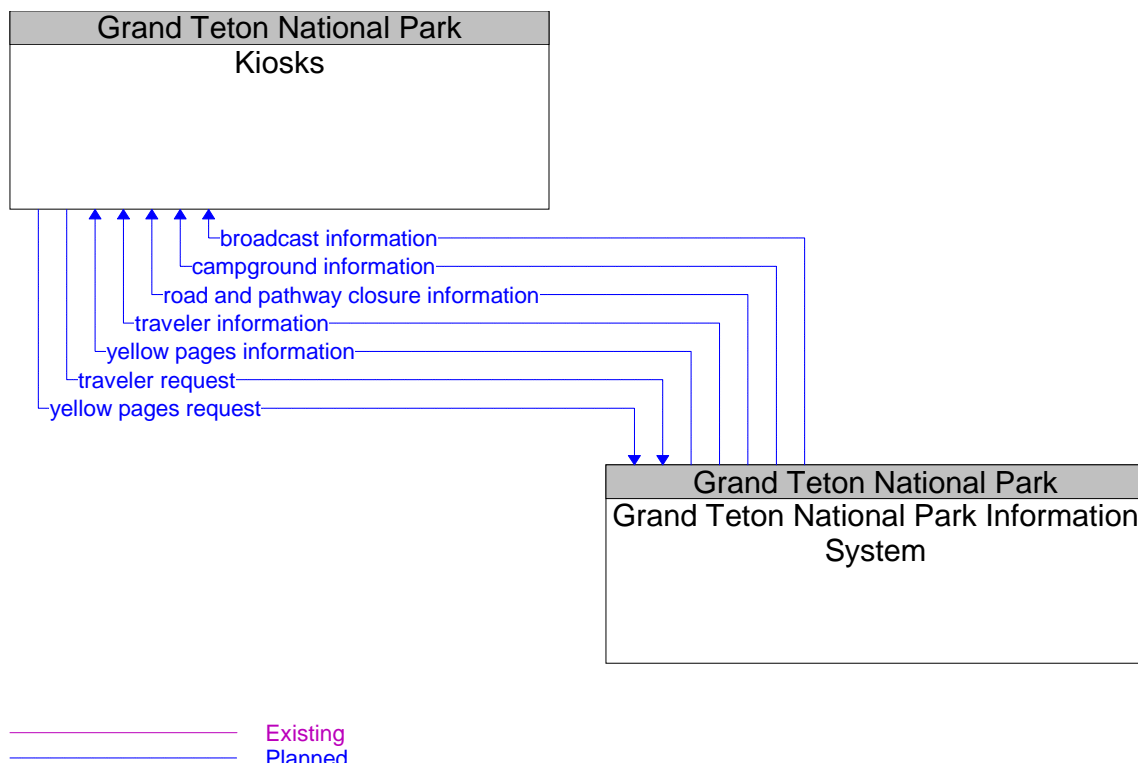
The Federal Highway Administration (FHWA) requires all ITS projects funded by the Highway Trust Fund to be in conformance with the National ITS Architecture. Only

though the development of an ITS architecture would Grand Teton National Park continue to remain eligible to utilize FHWA funds to implement ITS projects.

There are two major sections of the National ITS Architecture – the physical architecture and the logical architecture. The physical architecture is the part of the National ITS Architecture that portrays a physical representation of the important ITS interfaces and major system components. It provides a high-level structure around the processes and data flows defined in the logical architecture. The logical architecture defines what has to be done to support the ITS user services. It defines the processes that perform ITS functions and the information or data flows that are shared between these processes. The logical architecture consists of data flow diagrams, process specifications, and data dictionary entries. The logical architecture is not technology specific, as it does not dictate implementation of particular technologies.

To allow Grand Teton National Park to remain eligible for future ITS funding, I developed an ITS Architecture for Grand Teton National Park. I adapted the National ITS Architecture to meet the needs of Grand Teton National Park. I added elements, such as new campground information and wildlife information architecture flows, to those elements found in the National ITS Architecture to properly account for the conditions present at Grand Teton National Park. As an example of how information flows between elements in the Grand Teton National Park ITS Architecture, the figure below shows the architecture flows between the Grand Teton National Park Information System and kiosks that are planned to be installed in the park.

#### *Grand Teton National Park Information System – Kiosks*



The Grand Teton National Park ITS architecture contains dozens of sets of architecture flows. In addition, the park's ITS Architecture includes:

- Six subsystems of the National ITS Architecture,
- Seven terminators defining the boundary of the ITS architecture,
- Four market packages, which identify architecture components that are required to implement particular transportation services,
- Dozens of logical architecture processes that describe functions that need to be accomplished by an intelligent transportation system, and
- Over one hundred data flows, which portray the movement of data between processes or between a process and a terminator.

## **Parking Lot Counting Options**



Lupine Meadows Trailhead Parking Lot

Three of the five alternatives in the draft transportation plan call for the implementation of a parking lot management system. An important component of any parking lot management system is the determination of how many vehicles are occupying parking spaces during periods of peak parking demand. I identified and analyzed five options for counting vehicles:

- Ranger Observation
- Pneumatic Tubes
- Loop Detection Systems
- Piezoelectric Counters
- Video Detection Systems

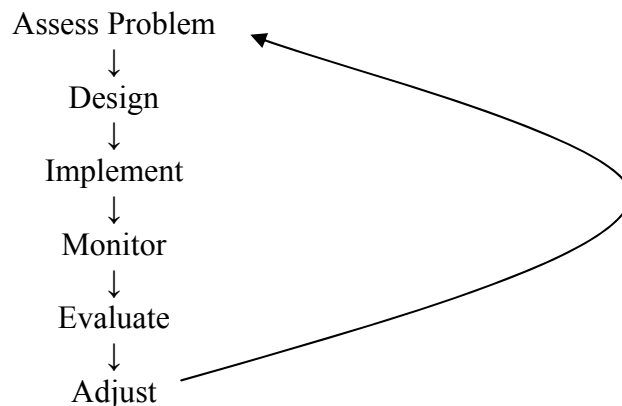
To evaluate which of the above options might be the best option for Grand Teton National Park, I considered the following factors:

- Installation Costs
- Maintenance Costs
- Weather
- Impact on Personnel
- Aesthetic Concerns
- Flexibility
- Power Source
- Linkage to Other Components of the Parking Lot Management System

I concluded that induction loops are the best option for Grand Teton National Park. Induction loops require little maintenance, pose no aesthetic problems and are significantly less expensive than a video detection system. I suggested that induction loops be tested at one or two parking sites before the park proceeds with full-scale implementation of a parking lot management system.

## Adaptive Management Plan

During the internal review of the transportation plan, the Deputy Superintendent of Grand Teton National Park requested that adaptive strategies be used in the implementation of the transportation plan. I discovered that adaptive management is often portrayed as a six-step process:





The basic idea is that criteria for making changes or improvements may be formulated now, but can change in the future as conditions change, and as more is known about the interrelationships between implementing different components of the transportation plan. In the adaptive management plan, I focused on two aspects of the transportation plan: the management of the Moose-Wilson Road and the phase in of the transit system. Below I describe the section of the adaptive management plan that pertains to the Moose-Wilson Road.



Moose-Wilson Road

Currently about 2,000 cars travel on the Moose-Wilson Road on a typical summer day. The Moose-Wilson Road links the Teton Village resort area with the Teton Park Road near the Park Headquarters in Moose. Much new development is expected to occur at Teton Village, which will result in increased traffic demand on Moose-Wilson Road. The Moose-Wilson Road also provides access to the Granite Canyon and Death Canyon trailheads, the JY Ranch and a number of in-holdings. Grand Teton National Park management would like to keep traffic on the Moose-Wilson Road to fewer than 2,500 cars per day. This is necessary to keep maintenance costs to a reasonable level. In addition, a high level of traffic on the Moose-Wilson Road would degrade the visitor experience due to increased congestion and noise.

In accordance with the objectives listed above, I created the following adaptive management plan for the Moose-Wilson Road:

1. Maintain the road as a two-way road with no access restrictions until average traffic volumes exceed 2,500 vehicles per day in the peak summer season.
2. After traffic volumes reach 2,500 vehicles per day, implement either a transit route on the road or a traffic management plan. The traffic management plan would consist of two-way traffic from Moose to the Death Canyon Trailhead and from the Granite Entrance Station to the Granite Canyon Trailhead. Traffic would be one-way southbound between the Death Canyon Trailhead and the Granite Canyon Trailhead, except for two-way traffic for transit vehicles, park vehicles and JY Ranch guests. Whether a transit route or a traffic management plan would be implemented will be dependent on the availability of funding for transit and any conditions resulting from the transfer of ownership of the JY Ranch from the Rockefeller family to the National Park Service. If both options are feasible at the time when traffic volumes on the Moose-Wilson Road reach 2,500 vehicles per day, then the option that best meets overall park goals should be implemented.
3. When traffic volumes once again reach 2,500 vehicles per day in the peak summer season after the implementation of one option, implement the other option.

Factors that could result in changes to this plan for the Moose-Wilson Road include:

- A. The status of transit implementation between Moose and Jenny Lake. If there is no transit route in place between Moose and Jenny Lake at the time that traffic volumes reach 2,500 vehicles per day on the Moose-Wilson Road, then the traffic management plan described above would be implemented instead of the transit route. As many potential riders of transit on the Moose-Wilson Road would want to connect at Moose to a bus traveling along the Teton Park Road, the absence of a Teton Park Road bus would likely result in few riders utilizing a Moose-Wilson Road bus. Only those visitors interested in accessing the Granite Canyon and Death Canyon trailheads, and Moose would be likely to consider riding a Moose-Wilson Road bus in the absence of connecting bus service.
- B. The ability to implement an effective pass or smart card system that would allow for visitors and staff at the JY Ranch to travel in both directions on the Moose-Wilson Road. If there are delays in the implementation of a pass or smart card system, then the implementation of the plan for managing the Moose-Wilson Road will likely have to be modified.
- C. The availability of funding to implement one of the above options.

## Lodge Transit Expansion



Experimental Yellowstone Yellow Bus and Grand Teton  
Lodge Company Bus Parked at Jackson Lake Lodge

In the Grand Teton National Park Transportation Plan, the draft preferred alternative calls for the implementation of transit service to be phased in. There would be three phases:

- Phase I: Expand existing lodge service.
- Phase II: Provide fixed routes from Jackson to Moose, from Teton Village to Moose and from Moose to South Jenny Lake.
- Phase III: Complete service to Colter Bay.

Currently, the Grand Teton Lodge Company runs a limited amount of bus service in Grand Teton National Park. In response to a park management request, I examined if it would be possible to stop improving transit service after Phase I, the expansion of lodge transit service. I concluded that if a lodge shuttle bus system is expanded, then fares should be kept to reasonable levels. However, it appears that only around 200 people per day would ride a lodge shuttle bus system, even with reasonable fares. As a result, the impact of operating such a system on the number of cars in the park would be negligible.



Therefore, the expansion of lodge shuttle service should only be a first step toward improving transit service in the park.

## Moving Trailheads



Death Canyon Trailhead

In the draft of the transportation plan, the relocation of the Lupine Meadows and Death Canyon trailheads were included under the section titled “Elements Common to All Action Alternatives.” As the moving of the trailheads was not explicitly stated in the section of the plan covering the preferred alternative, most reviewers of the transportation plan missed the fact that the trailheads were slated to be moved under the draft preferred alternative. After the issue of moving the trailheads became controversial, I was tasked with analyzing the relocation of the trailheads.

I advised against moving the Lupine Meadows trailhead. First, moving the trailhead would change the character of the experience. As the following photograph shows, one attraction of beginning a hike at the Lupine Meadows Trailhead is that the trailhead is very close to the base of the mountains:



Current Lupine Meadows Trailhead

Contrast the above photo with a photo near the proposed location of the new trailhead along Teton Park Road, where the mountains are further in the distance:



View from the Proposed Site of a Relocated  
Lupine Meadows Trailhead

Other factors that argue against moving the Lupine Meadows Trailhead are:

- The potential negative impact on wildlife.
- The negative visual impact of having a relocated parking lot marring the visual landscape for park visitors looking at the Grand Tetons while driving on the Teton Park Road, and



- Adding 1.5 miles to hikes, which would discourage some causal hikers from exploring this part of the park.

The Death Canyon Trailhead is a popular starting point for hikers. It is located on Death Canyon Road about 1.6 miles from the Moose-Wilson Road. The Death Canyon Trailhead serves two types of hikers. Many causal hikers use the Death Canyon Trailhead to go for short hikes to view Phelps Lake. More experienced hikers use the Death Canyon Trailhead to go on long hikes into Death Canyon and to other sites in the backcountry. Any relocation of the trailhead should satisfactorily serve the needs of both types of hikers.

I concluded that the Death Canyon Trailhead should either be left in its present location or moved to a site on the Moose-Wilson Road adjacent to the eastern boundary of the JY Ranch. The pros and cons of these two options appeared to be about even. However, I argued against a third option, moving the trailhead to the intersection of Death Canyon Road and the Moose-Wilson Road. This option would have added 3.2 miles to hikes along a road that is not very scenic – greatly reducing the number of causal hikers on the Death Canyon Road.

## **Animal-Vehicle Collisions**



Moose Adjacent to US 89 in Grand Teton National Park

I studied a number of possible countermeasures that could be utilized to reduce collisions between vehicles and wildlife in Grand Teton National Park. I reviewed and analyzed the following countermeasures to determine their applicability to Grand Teton National Park:

- ◆ Overpasses, Underpasses and Culverts
- ◆ Wildlife Detection and Warning Systems
- ◆ Signs
- ◆ Reduced Speed Limits
- ◆ Fencing
- ◆ Repulsive Scents

Based on my review, I concluded that Grand Teton National Park should conduct a test of animal-vehicle collision countermeasures. A logical location for such a test would be on a section of the Moose-Wilson Road that is scheduled for realignment under the transportation plan. This is in a part of the park that is particularly well known for wildlife viewing. An underpass could be constructed as part of the roadway realignment to facilitate animal migration. The underpass could be monitored to see how many animals use the facility. A wildlife detection and monitoring system could also be tested on the road.

## **Conclusion**

Grand Teton National Park faces many challenges over the next few years, including the construction of a new visitor center, possible airport expansion, the transfer of the Rockefeller family's JY Ranch to the park, the development of a winter use scheme that can be affirmed in the Federal courts and the restoration of many historic properties. As transportation issues are not the only issues facing the park, they must compete for limited staff time and resources.

Ultimately, Grand Teton National Park staff must make some key decisions on the direction to take transportation planning in the coming months and years. The new Superintendent, Mary Gibson Scott, is very interested in advancing transportation planning in the park. Hopefully, my transportation analyses will provide Grand Teton National Park management with insight that will help to shape the transportation decisions that will be made in the future.